

A clean copy of amended claim 1 appears in the Appendix hereto.

Claims 1 through 6 were rejected under 35 U.S.C. §103 for obviousness predicted upon Shinohara in view of Sakurai and Fu et al.

In the statement of the rejection, the Examiner **admitted** that Shinohara does not disclose the formation or removal of a hardened layer on the surface of the polyimide film. Nevertheless, the Examiner concluded that the claimed invention would have been obvious. This rejection is traversed as factually and legally erroneous.

There is no inherency.

As stressed in the response submitted November 1, 2002, inherency requires both certainty and art-recognition. *Crown Operations International, Ltd. v. Solutia, Inc.*, 180 F.3d, 62 USPQ2d 1917 (Fed. Cir. 2002); *Finnegan Corp. v. ITC*, 180 F.3d 1354, 51 USPQ2d 1001 (Fed. Cir. 1999); *In re Robertson*, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999). In order to establish the requisite **certainty**, it must first be established that the methodology disclosed by Shinohara **necessarily** results in the formation of a hardened polyimide film. Then it must be established that the oxygen ashing technique disclosed by Shinohara **necessarily** removes the upper surface of the polyimide film thereby insuring removal of the hardened polyimide film which is **not mentioned by Shinohara**. The **fortuitous** selection of the right passivation etching technique and the **fortuitous** selection of the right oxygen ashing conditions **undermine** the requisite **certainty**. *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994); *Continental Can Co., USA, Inc. v. Monsanto Co.*, 948

F.2d 1264, 20 USPQ2d 1746 (Fed. Cir. 1991); In re Oelrich, 666 F.2d 578, 212 USPQ 23 (CCPA 1981). **Thus, the Examiner's inherency theory lacks the requisite certainty.**

As pointed out above, the Examiner recognizes the legal requirement for **art recognition** of an allegedly inherent result. In attempting to establish art-recognition, the Examiner states that Shinohara employs an ashing process. The questions which arise are: (1) Under what conditions does Shinohara employ oxygen ashing? and (2) How much of the upper surface of the polyimide layer is removed, **assuming** that a hardened layer is formed to begin with by virtue of the disclosed etching technique of the passivation film?

The Examiner attempts to substantiate art-recognition by referring to column 2 of Sakurai, lines 41 through 49. **Suffice to say, Sakurai does not disclose the use of a photoresist polyimide film.**

The Examiner then attempts to buttress the art-recognition element by referring to column 5 of Fu et al., lines 39 and 40. **However, Fu et al. neither disclose nor suggest the formation of a hardened film on a photosensitive polyimide film.**

Applicants note that the limitations of claim 5 are incorporated into claim 1. In treating claim 5, the Examiner concluded that one having ordinary skill in the art would have determined the optimum amount of polyimide to remove by routine experimentation. **The problem with this approach is that the prior art neither discloses nor suggests that the amount of polyimide removal during oxygen ashing is a result effective variable which lends itself to optimization in the first place.** See *In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); In re Yates, 663 F.2d 1054,*

211 USPQ 1149 (CCP 1981); In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

Again, the prior art neither discloses nor suggests the formation of a hardened layer on the upper surface of the polyimide film. Ergo, it can not be concluded that one having ordinary skill in the art would have purposely adjusted the oxygen ashing step in order to ensure removal of an **unknown** hardened polyimide film or any particular amount of the polyimide film.

Applicants would refer to the decision in *Ex parte Schricker, 56 USPQ2d 1723, 1725 (BPAI 2000)*, wherein the Honorable Board of Patent Appeals and Interferences stated:

Inherency and obviousness are somewhat like oil and water-
they do not mix well.

Regrettably, in the January 14, 2003 Office Action, the Examiner **ignores** the fact that the prior art fails to recognize that a hardened layer is formed in the first place, and certainly fails to recognize that any particular thickness of the upper surface of the polyimide should be removed. This being the case, the Examiner's conclusion is without any factual basis. It is, therefore, legally erroneous to say that one having ordinary skill in the art would have been realistically motivated to remove an **unknown hardened layer. That which is unknown can not be obvious.** *In re Rijckaert, supra; In re Shetty, 566 F.2d 81, 195 USPQ 753 (CCPA 1977); In re Newell, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989); In re Spormann, 363 F.2d 444, 150 USPQ 449 (CCPA 1966).*
The Examiner is requested to respond to these specific legal arguments.

The Problem Element

It is well settled that the problem addressed and solved by a claimed invention must be given consideration resolving the ultimate legal conclusion of obviousness under 35 U.S.C. §103. *North American Vaccine, Inc. v. American Cyanamid Co.*, 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993); *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); *In re Newell*, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989); *In re Nomiya*, 509 F.2d 566, 184 USPQ 607 (CCPA 1975). The present invention stems from the recognition that a hardened photoresist layer is formed which adversely impacts dimensionally integrity (page 6 of the written description of the specification, lines 10 through 20). This problem is not even a blip on the radar screen of Shinohara. Indeed, Shinohara addresses a **different problem** from the addressed by the claimed invention. Shinohara is concerned with a problem attendant upon oxygen ashing which disassociates the imide coupling thereby reducing adhesion of the polyimide to the mold resin. On the other hand, the present invention is primarily concerned with dimensional accuracy and, in order to achieve that objective, forms an **undesirable** hard polyimide film which is then **purposely removed** by oxygen ashing. Oxygen ashing is employed by Shinohara is for the purpose of **reducing fluorine** contaminants.

Accordingly, the problem addressed and solved by the claimed invention merits consideration as potent indicium of nonobviousness.

Conclusion

Based upon the foregoing, Applicants submit that a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. §103 has not been established. Applicants submit that the Examiner's attempt to invoke the doctrine of inherency is misplaced. *Crown Operations International Ltd. v. Solutia Inc.*, *supra*; *Finnegan Corp. v. ITC*, *supra*; *In re Robertson*, *supra*. Moreover, upon giving due consideration to the problem and solved by the claimed invention, the conclusion appears inescapable that one having ordinary skill in the art would **not** have found the claimed invention obvious **as a whole** within the meaning of 35 U.S.C. §103. *Jones v. Hardy*, 727 F.2d 1524, 220 USPQ 1021 (Fed. Cir. 1984). Applicants, therefore, submit that the imposed rejection of claims 1 through 6 under 35 U.S.C. §103 for obviousness predicated upon Shinohara in view of Sakurfa and Fu et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

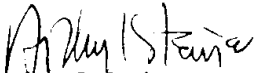
To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any

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excess fees to such deposit account.

Respectfully submitted,

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APPENDIX
(Clean Version)

Claim 1 now reads as follows.

1. (Amended) A method of manufacturing a semiconductor device comprising the steps of:
 - forming an interconnection on a semiconductor substrate having a semiconductor element formed thereon;
 - forming a passivation film on the semiconductor substrate including the interconnection;
 - forming a polyimide film, which serves as a buffer coating film, on the passivation film;
 - patterning the polyimide film;
 - etching the passivation film, while the patterned polyimide film is used as a mask, under conditions which form a hardened polyimide layer on the surface of the polyimide film;
 - ashing to remove 0.1 to several micrometers of the polyimide film, thereby removing the hardened layer formed on the surface of the polyimide film as a result of said step of etching; and
 - curing the semiconductor substrate after ashing process so as to transform the polyimide film into imide.